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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/830,598	04/27/2001	Junji Fujikawa	A-398	9504

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EXAMINER	
ROUHANIAN, MINOO K	

ART UNIT	PAPER NUMBER
1756	//

DATE MAILED: 09/16/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/830,598	FUJIKAWA ET AL.	
	Examiner	Art Unit	
	Minoo Rouhanian	1756	

-- The MAILING DATE f this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 April 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *10* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The information disclosure statement is received. The foreign prior art without translation is not considered.

Claim Objections

3. Claim 1 is objected to because it is grammatically incorrect.

Claim Rejections - 35 USC § 102(e)

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> > (e) the invention was described in-
> > (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> > (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

4. Claims 1-4 and 10-13 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by **Nozawa et al.** (U.S. Patent 6,395,434).

Nozawa et al. disclose a halftone phase shift mask blank for forming a phase shift mask, constituted by forming, on a transparent substrate, a semitransparent film which contains silicon, palladium, and at least one selected from nitrogen, oxygen and hydrogen (Col. 3,

lines 54-62). The halftone phase shift mask blank comprises at least one element selected from the group consisting of tantalum, tungsten, molybdenum, etc. (Col. 5, lines 1-4), a reflection preventive layer, etching stop layer, etching mask layer, and other layers can be formed as occasion demands (Col. 12, lines 57-60).

The oxygen and nitrogen content in the semitransparent film can vary from 0 to 65 atom % and more than 0 to 60 atom %, respectively (Col. 4, lines 17-31) and content of at least one element selected from the metals and transition metals such as tantalum can vary from more than 0 to 20 atom % (Col. 4, lines 50-54).

Claim Rejections - 35 USC § 102(b)

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-4 and 10-13 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by **Hashimoto et al.** (U.S. Patent 5,538,816) or **Mitsui** (U.S. Patent 5,804,337) or **Mitsui** (U.S. Patent 5,849,439).

Hashimoto et al. disclose a halftone phase shift photomask a region which is semitransparent to exposure light and a region which is transparent to the exposure light on a transparent substrate. The semitransparent film is arranged in the form of a multilayer film including layers of chromium or a chromium compound (abstract). The ratio of the number of chromium atoms to the number of oxygen atoms is in the range of

from 100:100 to 100:300 (Col. 9, lines 23-25) and the nitrogen atoms are contained in such a proportion that the total number of nitrogen and oxygen atoms is not larger than 350 per 100 chromium atoms (Col. 9, lines 33-36). The oxygen and nitrogen atoms are in complementary relation to each other. Therefore, the total number of oxygen and nitrogen atoms is always of the order of 200 to 300 per 100 chromium atoms (Col. 8, lines 11-15). The chromium compound consists essentially of chromium and oxygen, or chromium, oxygen and nitrogen, or chromium, oxygen and carbon, or chromium, oxygen, nitrogen and carbon and may contain a transition metal such as tantalum (Col. 17, lines 7-12). The semitransparent film has a multilayer structure formed from chromium compounds having different optical constants, therefore the transmittance and reflectivity can be controlled by combination of film thicknesses (Col. 18, lines13-16).

Mitsui (U.S. Patent 5,804,337) or **Mitsui** (U.S. Patent 5,849,439) also disclose the limitations recited in the above listed claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 5-9 and 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hashimoto et al.** (U.S. Patent 5,538,816) or **Mitsui** (U.S. Patent 5,804,337) or **Mitsui** (U.S. Patent 5,849,439) in view of **Mitsui** (U.S. Patent 6,037,083).

The teaching of Hashimoto et al. or Mitsui37 or Mitsui39 is applied and included herein.

Hashimoto et al. or Mitsui37 or Mitsui39 do not teach laminating halftone material film on the transparent substrate.

Mitsui83 teaches a halftone phase shift mask blank comprising a transparent substrate, a halftone material film laminated on that transparent substrate, and a metal film laminated on that halftone material film, wherein the metal film is formed by a plurality of metal films having different etching rates, and the etching rate for the metal film positioned on the transparent substrate side is set so that it is faster, either in stages or continuously, than the etching rate of the metal film positioned on the surface side (abstract). The halftone phase shift mask may contain a single layer or two or multilayer film structure (Col. 6, lines 23-28). The halftone material film may be made such that its main components are a metal, silicon, and oxygen and/or nitrogen such as oxidized tantalum and silicon, nitrogenized tantalum and silicon, oxidized and nitrogenized tantalum and silicon (Col. 5, lines 23-35). In the process steps from film formation to the point where the mask is finished, various chemicals such as acids and bases are sometimes used. Thus a problem arises when, due to the use of such chemicals, the properties of the halftone material film are changed, and the desired halftone properties are not obtained (Col. 2,

lines 12-19) and therefore increase the bonding strength and cause film peeling (Col. 2, lines 55-57).

It would have been obvious to one having an ordinary skill in the art at the time of the invention to combine the teaching of Hashimoto et al. or Mitsui37 or Mitsui39 with lamination of the halftone material film taught by Mitsui83 because as Mitsui83 teaches that lamination of the film eliminates the need to use acid and base on the halftone materials that could change the desired halftone properties (Col. 2, lines 55-57).

7. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Hashimoto et al.** (U.S. Patent 5,538,816) or **Mitsui** (U.S. Patent 5,804,337) or **Mitsui** (U.S. Patent 5,849,439) in view of **Mitsui** (U.S. Patent 6,037,083) and further in view of **Mohri et al.** (U.S. Patent 5,576,123).

The teaching of Hashimoto et al. or Mitsui37 or Mitsui39 in view of Mitsui83 as applied above and is included herein.

Hashimoto et al. or Mitsui37 or Mitsui39 or Mitsui83 do not specifically teach use of hafnium oxide as the etching stopper layer.

Mohri et al. teach a method of making a photomask by forming at least a light-blocking layer pattern or a combination of a light-blocking layer pattern and a hafnium oxide film

as an etch stopper layer for a shifter layer on a transparent substrate (abstract and Col 10, lines 4-7).

It would have been obvious to one having ordinary skill in the art at the time of the invention to use the teaching of Hashimoto et al. or Mitsui37 or Mitsui39 and combine them with the teaching of Mitsui83 and further with the teaching of Mohri et al. regarding the use of hafnium oxide film as the etch stopper layer because it would be obvious to use hafnium oxide, which is well known to be used as an etch stop layer for its known benefits.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Minoo Rouhanian whose telephone number is 703-605-0510. The examiner can normally be reached on 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9311 for regular communications and 703-872-9310 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

S. ROSASCO
PRIMARY EXAMINER